Important SQL Interview Questions

1. What is the difference between DELETE, TRUNCATE, and DROP?

- **DELETE**: Removes rows (can use WHERE), logs each row, rollback possible.
- TRUNCATE: Removes all rows, faster, no WHERE, minimal logging.
- DROP: Deletes the table structure and data permanently.

2. What are Primary Key and Foreign Key?

- Primary Key: Uniquely identifies a record in a table, cannot be NULL.
- Foreign Key: Links one table to another using the Primary Key of the parent table.

3. Difference between WHERE and HAVING?

- WHERE: Filters rows before grouping.
- HAVING: Filters groups after GROUP BY.

4. Difference between INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN?

- INNER JOIN: Returns matching rows from both tables.
- LEFT JOIN: All rows from left + matching from right.
- **RIGHT JOIN**: All rows from right + matching from left.
- FULL JOIN: All rows from both (matched + unmatched).

5. What is a Subquery?

- A query inside another query.
- Types:
 - Single-row (returns one value)
 - Multi-row (IN, ANY, ALL)
 - Correlated (depends on outer query).

6. Difference between UNION and UNION ALL?

- UNION: Combines results, removes duplicates.
- UNION ALL: Combines results, keeps duplicates.

7. Difference between CHAR and VARCHAR?

- **CHAR(n)**: Fixed-length (pads spaces), faster.
- VARCHAR(n): Variable-length, saves space.

8. Difference between Clustered and Non-clustered Index?

- **Clustered Index**: Sorts and stores data physically in the table (1 per table).
- Non-clustered Index: Stores pointers to data, can have many.

9. Difference between DDL, DML, DCL?

- DDL (Data Definition): CREATE, ALTER, DROP.
- DML (Data Manipulation): SELECT, INSERT, UPDATE, DELETE.
- DCL (Data Control): GRANT, REVOKE.

10. Difference between NULL and 0?

- **NULL**: Unknown / missing value.
- **0**: Numeric value.

11. Explain Window Functions.

- Functions that operate on a set of rows without collapsing them.
 - o ROW_NUMBER(): Unique sequence number.
 - RANK(): Rank with gaps.
 - DENSE_RANK(): Rank without gaps.

12. What is a CTE?

- CTE (Common Table Expression): Temporary result set defined with WITH.
- Easier to read than subqueries, can be recursive.

13. What are ACID properties?

- Atomicity all or nothing.
- Consistency maintains data integrity.
- Isolation transactions don't affect each other.
- **D**urability committed data is permanent.

14. Difference between EXISTS and IN?

- **IN**: Checks values in a list.
- **EXISTS**: Checks if subquery returns rows (faster with large data).

15. What is Normalization?

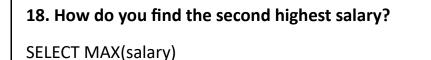
- Process of organizing data to reduce redundancy.
 - 1NF: Atomic values.
 - 2NF: No partial dependency.
 - o **3NF**: No transitive dependency.

16. What is Denormalization?

• Adding redundancy to improve performance (fewer joins, faster queries).

17. What are Transactions?

- A unit of work executed as a whole.
- Controlled by: BEGIN, COMMIT, ROLLBACK.



FROM employees

WHERE salary < (SELECT MAX(salary) FROM employees);

19. What are Constraints in SQL?

- Rules applied on columns.
 - NOT NULL No NULL values.
 - **UNIQUE** Must be unique.
 - o **PRIMARY KEY** Unique + Not Null.
 - FOREIGN KEY Links tables.
 - CHECK Condition-based.
 - DEFAULT Sets default value.

20. Difference between Stored Procedure and Function?

- Stored Procedure: Can return multiple values, supports transactions, called with EXEC.
- Function: Returns a single value/table, can be used in SELECT.